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CHAPTER 11



Lev S. Vygotsky's Cultural-Historical Theory of Psychological Development

Culture creates special forms of behavior. . . . In the process of historical development social man changes the ways and means of his behavior, transforms the natural instincts and functions, [and] elaborates and creates new forms of behavior. (Vygotsky, 1931/1966, p. 19)

The work of Lev Vygotsky, which spanned the brief period from 1924 to 1934, has steadily grown in influence in the United States since the early 1980s. Unfortunately, however, misconceptions about his work have entered the mainstream of Western discourse, complicating the analysis of his contributions to educational psychology. Some scholars note that Vygotsky is credited with being 50 years ahead of his time for ideas that he himself credited to others (Cole, 1996; Valsiner, 1988; van der Veer & Valsiner, 1991). For example, some Westerners, unfamiliar with history, sometimes credit Vygotsky with the view that culture is a major influence on human cognitive development. However, the concept was introduced by two German academics, Moritz Lazarus and Hijam Steinthal, 60 years prior to Vygotsky's work, and it became the cornerstone of Wundt's "second psychology" (discussed in chapter 1). At the time Vygotsky entered psychology, anthropologists were debating various issues about the relationship between culture and individual development. Among them were the nature of the cultural influence on the individual, the relationship of different cultures to different forms of thinking (van der Veer & Valsiner, 1991), and whether different cultures form a continuum from "primitive" to "advanced" (Cole, 1996).

Initial misconceptions about Vygotsky's work are the result of several factors. One is the rapid acceptance and popularity of the theory, which Valsiner (1988) suggests is inversely related to the depth of understanding. Others are translation difficulties of some Russian words that do not have an English equivalent, lack of accessibility to many of his writings, and initial reliance on limited translations. Vygotsky's writings were banned in the USSR from 1936 until the 1950s (Valsiner, 1988). Then, in the 1970s and early 1980s, as U.S. interest in the theory emerged, 82.2% of the citations in English-language journals

(1969 to 1985) were to only two abridged translations of a few of his ideas (Valsiner, 1988).

Among the misconceptions about Vygotsky are (1) the often-repeated story about his entry into psychology, (2) the belief that the zone of proximal development is a major concept in the theory, and (3) omissions of the role of the teacher and formal schooling, particularly concept learning, in the development of higher cognitive functions. Clarification of these issues is facilitated by the detailed 10-year research and translation of many of Vygotsky's unpublished works, archival documents, and family correspondence by René van der Veer and Jean Valsiner (1991), and careful reading of the English editions of Vygotsky's collected works.

Vygotsky was born in Orsha, a town in western Russia near Minsk, in 1896, the same year that Piaget was born. Precocious as a child, Vygotsky was known for excelling in multiple intellectual pursuits. As an adolescent, with a circle of friends, he debated ideas such as Hegel's philosophy of history and the role of the individual in society (van der Veer & Valsiner, 1991).

On graduating from the gymnasium, he earned a gold medal, signifying the highest grade in all his subjects (Valsiner & van der Veer, 2000). He then engaged in studies at two universities in Moscow simultaneously, graduating from both in 1917, according to his daughter Gita (p. 330). Returning to his native province, Vygotsky taught at several institutes, set up a psychological laboratory at Gomel Teacher College, organized "literary Mondays" in the community for the presentation and discussion of literary works, wrote weekly theater reviews, co-founded a short-lived library journal, co-founded a publishing house, and headed the theater section of the Gomel Department of People's Education (Valsiner & van der Veer, 2000; van der Veer & Valsiner, 1991, p. 10).

Vygotsky's entry into psychology in 1924 was, in many ways, an accident of history. A humanist scholar with no formal training in psychology, Vygotsky came to the attention of the Director of the Moscow Institute of Experimental Psychology through one of the papers he presented at the second Psychoneurological Congress in Petrograd in January 1924. The presentation on the research methods of reflexology and psychology (Vygotsky, 1926/1971) discussed (1) the importance of psychology becoming a unified science that studies mind as well as behavior, (2) the inability of introspection to yield reliable, objective data, and (3) the need to go beyond the current methods of reflexology, which had "reached a dead end" (p. 47).

The often-repeated account of the paper is that it was such an electrifying presentation critical of Pavlov's reflexology that Vygotsky was invited to join the Institute. However, audience reaction seems to have been moderately enthusiastic (Joravsky, 1989). Nevertheless, the talk held appeal for the Institute director, Konstantin Kornilov, because (1) it raised questions about the rival discipline to Kornilov's reactology, and (2) Kornilov also subscribed to the view of a unified and objective study of the conscious mind (van der Veer & Valsiner, 1991, p. 43). In addition, both Kornilov and Vygotsky were interested in Hegelian synthesis as essential to understanding complex processes (p. 123). Further, after the dismissal of the prior Institute director and many of

his staff for “idealism” (subjective psychology), Kornilov was hiring new personnel and offered Vygotsky a position (van der Veer & Valsiner, 1991).

Of interest is that, under ordinary circumstances, Vygotsky would not have obtained an academic position in psychology. However, in the reorganization of society under the Bolsheviks, old professional hierarchies had broken down, and educated individuals who did not oppose the Bolsheviks were in short supply in the largely illiterate country (Fitzpatrick, 1992). Valsiner (1988) noted that, 10 years earlier, psychology would not have been interested in Vygotsky, and, 10 years later, psychology would not have interested him.

Vygotsky's primary goal was to reformulate psychology as part of a unified social science (Joravsky, 1989; van der Veer & Valsiner, 1991). In his view, given the unique characteristics of humans (described in chapter 1), psychology should address the ways that human abilities develop, and it would fail in its major task if it could not explain the formation of human behaviors (Vygotsky, 1924/1979a; 1926/1997l).

Vygotsky further defined the broad focus of his theory as explaining the qualitative changes that account for the emergence of higher psychological (cognitive) functions at the levels of both the human species (phylogeny) and the individual (ontogeny). He began this quest by examining the writings of Western psychologists and sociologists that he and his colleagues translated into Russian. However, he found the psychological explanations of human cognition described by existing learning theories to be inadequate (Vygotsky, 1931/1997a, pp. 65–69; Vygotsky, 1926/1997h, pp. 149–151; Vygotsky, 1931/1997l, pp. 28–39; Vygotsky, 1926/1997l; Vygotsky, 1934/1997g). For example, although the Gestalt principle of structure is found in the intelligence of both the chimpanzee and the child, it is insufficient to explain the “central core” of human cognitive development (Vygotsky, 1934/1997g, p. 212).

Vygotsky also analyzed the writings of Western anthropologists and ethnopsychologists (van der Veer, 1991; Vygotsky, 1930/1997f; Vygotsky & Luria, 1930/1993, pp. 79–137), drawing on many of their concepts. Some he modified and supplemented with additional work, and he integrated this broad range of ideas into a theory that went beyond the disciplinary boundaries of the social sciences, humanities, and historical sciences (Wertsch, 1985a).

In addition to developing his theory, Vygotsky, like other psychologists in the war-ravaged country, fulfilled multiple roles. He addressed the problems of mentally retarded, blind, and deaf-mute children, became a skilled clinician, and participated in the founding of the Institute of Defectology, for which he was appointed “scientific leader” (van der Veer & Valsiner, 1991, p. 45). He was also involved in organizing child study in the Soviet Union (van der Veer & Valsiner, 1991). He also organized medico-pedagogical conferences in which doctors, psychologists, special education teachers, and others observed his examinations of special needs children with their parents (Vygodskaja, 1998).

This schedule of activities led to periodic life-threatening bouts of tuberculosis, a disease he had contracted as a young man while caring for his ill

brother (van der Veer & Valsiner, 1991). Vygotsky was unable to defend his dissertation in the summer of 1925, and in October 1925, the dissertation, *The Psychology of Art*, was accepted for the Ph.D. degree without a public defense.

Although ill with tuberculosis, Vygotsky mustered a Herculean effort to accomplish his goals. Living in one room in a crowded apartment with his wife and two daughters, he often wrote after 2 A.M., the only time when he had a few quiet hours to himself (Wertsch, 1985a). Some of his writings were begun in the crowded, noisy barracks atmosphere of the sanatoriums where he was periodically hospitalized (see excerpts from Vygotsky's correspondence translated in van der Veer & Valsiner, 1991).

In the last three years of his life, Vygotsky completed manuscripts, articles, and books at an almost frenetic pace. Needless to say, his tuberculosis worsened and, in June 1934, he died at the age of 37.

A few of Vygotsky's writings were published after his death. However, his theory was receiving criticism for "bourgeois thinking" and in 1936 the intellectual climate changed. The Central Committee of the Communist Party banned all psychological testing in the USSR. At the same time the leading psychological journals ceased publication for nearly 20 years. Later some of Vygotsky's views were found to conflict with Stalin's 1950 essay on linguistics and thus were not published until 1956 (Wertsch, 1985a).

Vygotsky's major theoretical writings included the role of cultural signs and symbols in the development of attention, abstraction, language, memory, numeric operations, and reasoning (Vygotsky, 1929; 1931/1997a; 1930/1999b; 1931/1997j; Vygotsky & Luria, 1930/1993); his identification and discussion of the outcomes of cognitive development labeled the higher psychological or mental functions (Vygotsky, 1931/1997j; 1931/1966; 1930–1931/1998a); the key role of scientific (subject-matter) concepts in developing thinking (Vygotsky, 1934/1987a; 1934/1987b; 1930–1931/1998b); and the relationship of thinking and speech (Vygotsky, 1934/1987c; 1934/1987d).

However, Vygotsky's concept of the cultural and historical development of cognitive functions remained incomplete at his death. Among the issues he had begun to address at that time were the possible hierarchical relationships among mental functions and the development of affect and its role in intellectual processes (Bozhovitch, 1977, p. 15; Vygotsky, 1999c).

PRINCIPLES OF PSYCHOLOGICAL DEVELOPMENT

Vygotsky's goal was to create a psychology that was theoretically and methodologically equal to the task of investigating uniquely human characteristics.

Basic Assumptions

The framework for the analysis of human cognitive functions constructed by Vygotsky rests on three assumptions. They are (1) the nature of human intelligence, (2) the delineation of two different lines of psychological development,

referred to as biological and cultural-historical, and (3) the design of an experimental method for the investigation of dynamic psychological processes.

The Nature of Human Intelligence

Vygotsky's description of the nature of human intelligence includes four related topics. They are (1) the differences between animals and humans, (2) the philosophical foundations that formed the basis of his theory, (3) the designation referred to as psychological tools, and (4) the influence of culture on human cognitive development.

Animal/Human Differences in Mental Activities. Vygotsky took issue with the views of behaviorism and Gestalt psychology, because they based their views of cognition on research with animals. The stimulus-response paradigm, for example, reflects associations that are united only on the basis of a "purely external coincidence in time" (Vygotsky, 1931/1997i, p. 31).

Furthermore, the Gestalt structural principle, which maintains that the subject reorganizes her understanding of a situation by mentally restructuring the role of a tool available for solving problems, is not the same for chimpanzees and children (Vygotsky, 1934/1997g). First, a structured action is not necessarily an intellectual act (p. 205). The ape's goal-directed action is meaningful within the experimental situation, *but is meaningless beyond those boundaries* (p. 209). In contrast, the child's capability for speech liberates her activity and leads to the concept of the "objective nature of the tool," which is not dependent on any particular situation (p. 214).

Second, the universality claimed by the Gestaltists for the structural principle means that "the perception of a chicken [animal used in some Gestalt experiments] and the actions of a mathematician, which represents the most perfect model of human thinking, are equally structured" (Vygotsky, 1934/1997g, p. 225). If this is so, then the structural principle "is insufficiently dynamic to bring out the novel phenomena that arise in the course of development itself" (p. 225).

Philosophical Foundations. Vygotsky drew on three philosophical perspectives for the foundation of his theory. One was a belief in rational man and the control of one's passions through the human mind, expressed by Benedict Spinoza, Vygotsky's favorite philosopher (Yaroshevsky, 1989; van der Veer & Valsiner, 1991, p. 15). Vygotsky's theory describes the ever-increasing mastery of one's behavior through the development of complex and powerful intellectual functions.

The second philosophical influence was the description of change as dialectical synthesis, described by G. W. F. Hegel. Briefly, dialectical synthesis involves (1) the negation of a thesis by its opposite, antithesis, followed by (2) a resolution of that interaction in the form of a qualitatively new formation, a synthesis. For example, matter, which is the foundation of existence, is not viewed as absolute and unchanging. Instead, the world of matter is "a combination of processes, externally changing or developing" (Kornilov, 1930, p. 250). Light, heat, electricity, magnetic currents, chemical transformations, life, and psychological processes are examples; Vygotsky (1930/1997e) described the processes

of cognitive development as both uninterrupted, “accompanied by leaps or the development of new qualities” (p. 112), and “a complex dialectical process” (Vygotsky, 1931/1997c, p. 99). The characteristics include a disproportionate development of separate intellectual functions, qualitative transformations of some forms of thinking into others, merging of the processes of involution and evolution in complex ways, and complex interactions of external and internal factors.

The third philosophical influence consisted of some general concepts from Karl Marx and Frederic Engels. They built on Hegel's concept that humans create diverse worlds (cultures) in which work provides the means through which humans perceive the world as independent objects and acting subjects. Marx and Engels maintained that humans affect the environment by changing it, and, through these efforts, change their own nature as well (Marx & Engels, *Collected Works*, Vol. 23, in Vygotsky, 1931/1997i, p. 55). The essential factor in changing human nature is the tools of work. Further, tool invention by pre-humans led to (1) the emergence of humans because it led to labor, the need for cooperation, and speech (Engels, 1925/1978); (2) through tool use, humans transform both nature and themselves; and (3) the particular social organizations that result from tool use determine human mental life (Engels, 1940). Thus, human labor transforms both nature and human experience. The discovery of fire, the invention of simple agricultural tools, and the discovery of electricity are examples.

The Role of “Psychological Tools.” Two difficult questions for psychology were left unanswered by the designation of tools as instruments of change. First, how does a relatively simple activity, tool use, account for such sweeping developments as the emergence of the human species and advanced cognitive development? Second, what are the relationships among tool use, social organizations, and differences in cognitive development?

Essential to bridging the gap between tool use and cognitive development was Vygotsky's designation of cultural signs and symbols as *psychological tools*. Likely sources for this concept were (1) Wolfgang Köhler's references to “the priceless tool of speech,” and (2) Emile Durkheim's discussions of the collective representations of a society as “clever instruments of thought” (van der Veer & Valsiner, 1991, pp. 302, 206).

According to Vygotsky, the importance of these psychological tools (signs and symbols) is that they, rather than the tools of work, bring about the transformation of human consciousness and are the instruments essential to the development of higher cognitive functions. In other words, the essential difference between technical tools and psychological tools is that technical tools change an external situation but psychological tools direct the mind and change the process of thinking (Vygotsky, 1931/1997i, p. 62). Moreover, these psychological tools differ throughout human history and across cultures. The theory developed from this foundation was referred to by Vygotsky as the *cultural-historical theory of the psyche* (Leont'ev & Luria, 1968).

The Influence of Culture on Human Development. Relationships among the use of signs and symbols (psychological tools), social organizations, and cognitive development at the species level discussed by contemporary

anthropologists are found in Vygotsky's untranslated work (van der Veer & Valsiner, 1991). Among them are (1) thought and language are more well developed in contemporary cultures (Lévy-Bruhl, 1910/1922, 1922/1976), and (2) different cultures imply different kinds of cognitive growth through their various developments in law, music, art, language, religion, writing, and counting systems (Thurnwald, 1922). However, Vygotsky (1931/1966) retained only symbol systems from Thurnwald's list because they can serve as psychological tools to self-regulate cognitive processes and therefore transform behavior (van der Veer & Valsiner, 1991).

An early example is the so-called "messenger's wands" found in Australia (Leont'ev, 1959). They are large sticks or rectangular wooden slabs marked by a series of cuts. The sticks or slabs were given to messengers as they were sent out to deliver communications to distant tribes.

The notches were not arbitrary symbols of syllables or words, however. Instead, they were memory aids designed for the messengers. The notches designated certain persons and objects and their number and localities to the extent that they occurred in the given message. With the aid of this simple device, the messenger reconstructed the message at the time of delivery.

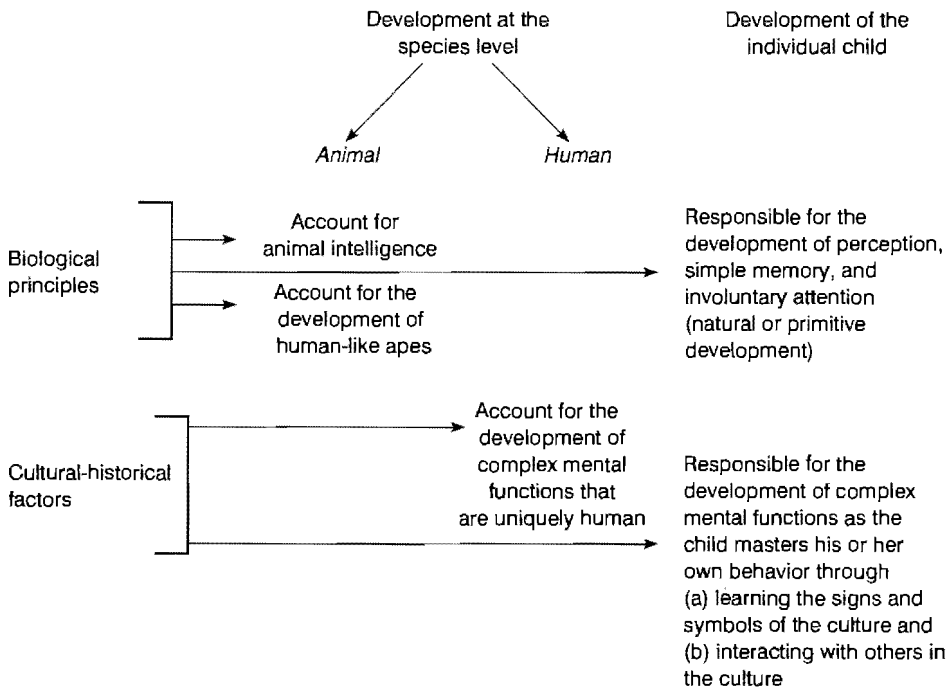
The uniquely human events associated with the use of these wands is that (1) new connections are established in the brain through the act of perceiving the external reminder and returning to the ideas they represent, and (2) the construction of the process of memorizing is accomplished by externally forcing an external object to remind the individual of something (Vygotsky, 1929/1977b, p. 69).

Further, agreeing with Thurnwald (1922), Vygotsky (1929; Vygotsky & Luria, 1930/1993) maintained that cultural diversity in symbols leads to differences in the level of mental functions. For example, in one village in Papua New Guinea, counting is accomplished by using body parts (Saxe, 1981). Counting begins with the right thumb, progresses around the hand, arm, shoulder, right ear, eyes, and then down the left side to the left forearm and fingers. Because the maximum number that may be counted using this method is 29, villagers have great difficulty with even simple addition and subtraction problems. Furthermore, the counting system limits the quantities that can be added and subtracted.

In contrast, cultures with advanced mathematical systems can produce individuals who think about differential equations in calculus. Therefore, the complexity of symbol use in a culture sets broad parameters for individual development.

Biological and Cultural-Historical Lines of Development

Analysis of the differences between animal and human behavior led to the identification of two qualitatively different lines of psychological development (Figure 11.1). One line is that of the biological factors that were a part of the evolutionary process. Included are the development of the central nervous system and physical growth and maturation. In the human species, biological factors dominate the early months of life, accounting for the development of perception, simple memory, and involuntary attention. The emergence of these elementary mental functions is also referred to as natural or primitive development (Vygotsky, 1929/1977b).

**FIGURE 11.1**

The influence of biological and cultural-historical lines of development

Part of the biological heritage of both animals and humans is the process referred to as **signalization**, which is the recognition of co-occurring stimuli in the environment (Vygotsky, 1929/1977b; 1931/1997i, p. 55). For example, the young gazelle learns to recognize the appearance of a lion as an indicator of danger. Similarly, a young child puts his hand on a hot stove and feels pain. On approaching the stove again, the child recalls the pain and exercises caution.

The essential difference between animal and human behavior is that humans progressed beyond their biological heritage. Early humans began to create and use culturally based signs and symbols, such as the knot-tying systems (quipu) used in ancient Peru for keeping count of those slain in battle and other events (Vygotsky & Luria, 1930/1993, p. 103). This and other creations of signs and their use is referred to as **signification** (Vygotsky, 1929/1977b; 1931/1997i, p. 55). This process differentiates human behavior from that of other animals; the signs created by early humans initiated cultural-historical development.

This second line of development also plays a key role in the cognitive growth of the individual child. The child inherits the symbol systems of his or her culture, and, depending on their complexity, these systems may lead to the development of rudimentary thinking skills (e.g., counting, simple addition and subtraction) or complex thinking skills (e.g., operating with differential

functions and advanced probability systems). In other words, psychological development involves the transformation of primitive (or natural) mental functions to higher mental forms.

Although cultural-historical factors influence both the development of the species and of the child, three important differences may be identified. First, childhood does not repeat the stages that occurred in the development of civilization. (One early psychologist, G. Stanley Hall, maintained that childhood included the same stages as civilization, i.e., ontogeny recapitulates phylogeny. The theory, however, was found to be scientifically unsound.)

Second, in the development of the culture, humans are the creators and elaborators of sign systems. In contrast, the child is involved in the activity of mastering and internalizing the available sign systems and the associated reasoning processes. Third, when cultural development began for the human species, biological factors, in terms of influencing species development, were displaced. However, in the cognitive development of the individual child, biological factors become subordinated to cultural development in a complex transformative process.

In summary, the behavior of a modern cultured adult is the result of two different processes of mental development. One is the biological evolution of the animal species that gave rise to the species *Homo sapiens*. The second is the process of historical development that transformed primitive humans into humans who use signs and symbols to change their mental functioning (Vygotsky, 1931/1966).

The Experimental-Genetic (Developmental) Method

Vygotsky described the processes of cognitive development as complex and everchanging. However, the problem with experimental research is that these processes have not been studied (Vygotsky, 1931/1966, p. 21). Instead, psychological research has made use of only one model, that of stimulus-response. Regardless of the process under study, the psychologist exerts some action on the individual or exposes him or her to particular stimuli and analyzes the individual's reaction. Different constellations of stimuli and various reactions have been studied. However, not one fundamental step has been made beyond this basic model (Vygotsky, 1931/1966, p. 21). Until psychology bases its studies on the premise that psychological functions change under the influence of sociocultural experience, it will not discover the laws of human behavior (Leont'ev, 1977, p. 61).

To discover the dynamics of the development of human mental functions, Vygotsky (1929/1979b) and his co-workers devised experiments referred to as the **experimental-genetic method**. The researchers modeled their experiments on those that Köhler conducted with anthropoid apes (Vygotsky, 1929). The apes were placed in problem-solving situations with a means to the solution nearby. Similarly, Vygotsky and his colleagues presented children with tasks that were above their natural capacities, such as remembering a list of words. Objects were available nearby that could assist the child, such as a set of pictures. The researchers observed whether the additional stimuli ceased being neutral stimuli and became part of the problem-solving process, thereby changing the nature of

the process. By implementing the tasks with children of different ages, the researchers identified differences in cognitive functioning (see Vygotsky & Luria, 1930/1993, pp. 175–192).

This experimental model is referred to as the functional method of double stimulation (Vygotsky, 1929, p. 430; 1984/1999a, p. 59). That is, the child's behavior is organized by two sets of stimuli, each of which has a function in behavior. One is the object of the task (such as remembering a set of words) and the other can serve as an auxiliary means to complete the psychological operation (e.g., a set of pictures). In the "forbidden colors" game, for example, the child forfeited points for "forbidden" answers, such as naming the color red and naming any color more than once. Examples of the 18 questions (the first stimulus set) included "Do you go to school? What color are the desks in school? Do you like to play? What color is grass?" (Vygotsky, 1929/1979b; Vygotsky & Luria, 1930/1993, p. 191). The child also received a set of cards, each a different color (the second stimulus set).

Observations indicated that preschoolers did not use the cards effectively, often looking at them at inappropriate times. However, older children (1) set aside the cards with the forbidden colors, and (2) added cards to the stack as they named other colors.

The importance of implementing this model with children of different ages was to explain the origins and causal-dynamic connections of a cognitive process to other processes that influence its development (Vygotsky, 1930/1977a, p. 76). In this way, research avoids addressing a complex reaction in its "finished and dead form . . . in its automatized form" (p. 75). At that point, processes have become a sort of fossil (p. 71).

Summary of Basic Assumptions

First, Vygotsky maintained that psychology should study humans, rather than animals, to discover the unique aspects of human cognition. Second, three philosophical views that formed the foundation of his work are (1) the Spinozan perspective that humans are rational and gradually gain control of their own thinking, (2) cognitive change can be characterized as the dialectical synthesis described by G. W. F. Hegel, and (3) the tools developed by humans changed their nature as well as the environment.

Third, Vygotsky identified psychological tools, which are the signs and symbols that serve as instruments of thought, as essential in the development of higher cognitive functions. These psychological tools, which are the products of one's culture, set broad limits on the level of higher cognitive thinking that the child can attain. That is, biological principles account for the development of natural (or primitive) functions whereas the signs and symbols of one's culture contribute to the development of complex ways of thinking.

Fourth, because cognitive processes are dynamic and ever-changing, they must be studied using research methods that reveal their dynamic nature. The aim of psychological research is (1) process analysis rather than object analysis, (2) an accounting that reveals real, causal, or dynamic relations, and (3) an explanation of the origins of cognitive processes (Vygotsky, 1931/1997a).

The Components of Cognitive Development

Key principles describe the transformation of primitive mental functions, such as involuntary attention and simple memory, into complex functions such as logical memory. Two principles are the two branches of cultural cognitive development and the general law of genetic development. The other major concepts are the role of imitation and the natural history of the sign.

The Two Branches of Cognitive Development

Vygotsky (1931/1966, 1931/1997m, p. 14) maintained that the development of higher mental functions encompassed two sets of processes that, initially, may seem to be unrelated. Instead, the development of higher cognitive functions consists of

... two inseparably connected but never confluent streams of development of the higher forms of behavior. These are, first, the processes of mastering the external means of cultural development and thinking—language, writing, counting and drawing, and secondly, the processes of development of the special higher mental functions. (Vygotsky, 1931/1966, p. 16)

Stated another way, “in the process of development, the child not only masters the items of cultural experience, but the cultural forms of reasoning” (Vygotsky, 1929, p. 415). That is, complex cognitive functions are developed in the process of subordinating symbol systems to human control to carry out cognitive tasks (Vygotsky, 1929/1979b). Using colored cards to monitor the color names that one has used in a game is an example. Constructing a hierarchy of related concepts in a subject area is another.

The inference that may be made from these statements is that learning to communicate with language is a necessary but not sufficient condition for the development of higher cognitive functions. This inference is supported by Vygotsky’s description of signs and symbols as only potential psychological tools. Specifically, “a stimulus becomes a psychological tool not by virtue of its physical qualities . . . (but) by virtue of its use as a means of influencing the mind and behavior” (Vygotsky, unpubl. manu./1997k, p. 85). Examples of psychological tools and their complex systems include “language, different forms of numeration and counting, mnemotechnical techniques, algebraic symbolism, works of art, writing, schemes, diagrams, maps, blueprints, all sorts of conventional signs, etc.” (p. 85).

The General Law of Genetic Development

Central issues to understanding a basic principle of Vygotsky’s theory are the components of the law of genetic development and the role of peers, teachers, and the learner (discussed in the section “Principles of Instruction”).

The basis for Vygotsky’s law of genetic development is the social-behavioral relationship described by the French psychologist Pierre Janet (van der Veer & Valsiner, 1988). Specifically, all higher psychological processes develop through

the application of aspects of social relationships to oneself, and words are the most powerful social stimuli because they originated as commands (Janet, 1926, 1929, cited in van der Veer & Valsiner, 1988; Vygotsky, 1931/1966).

Vygotsky (1931/1997c) stated the general law of genetic development as

every function in the cultural development of the child appears on the stage twice, in two planes, first, the social, then the psychological, first between people as an intermental category, then within the child as an intramental category. (p. 106)

In other words, every higher mental function was external or social before it became an internal mental function (p. 105). Included in the higher functions are categorical perception, conceptual thinking (verbal and mathematical), logical memory, and voluntary (self-organized) attention (see the section "The Nature of Complex Thought").

The law of genetic development also applies to learning the meanings of words, signs, and symbols. An example is a child learning the pointing gesture (Vygotsky, 1931/1966, 1931/1997c, p. 104). First, when the child tries to grasp an out-of-reach object, her hands are stretched toward the object and are left hanging in the air. The movement is objectively indicating an object. When the mother comes to help, the situation changes. That is, the response to the unsuccessful grasping movement of the child is a reaction by the mother, not by the object (pp. 104–105).

Later, the child is able to link her grasping movement to the total situation, and the child understands her actions as a pointing gesture. Here the function of the movement changes. Instead of a movement directed toward an object, it becomes a form of communication, a movement directed toward another person. The child then uses the gesture as a signal or indicator to others. In other words, the conscious use of the gesture is late in its development. The child also is the last one to realize its meaning. At this point, the gesture becomes a direction for the child herself.

The Role of Imitation

The process of the internal acquisition of the role of signs or symbols is not automatic. Instead, the transition from the external social plane to the internal psychological plane is one in which the child begins to practice with respect to himself the same forms of behavior that others formerly practiced with respect to him (Vygotsky, 1931/1997n, p. 88).

Particularly important is that such actions are the key to the individual's mastery of his or her behavior (p. 88). In other words, a basic path in the cultural development of the child is imitation (p. 95). However, in Vygotsky's (1931/1997n) view, imitation is not a simple mechanical transfer from one to another. Instead, the process of imitation requires "a certain understanding of the significance of the action of another" (p. 95). For example, if the individual knows nothing of chess, she cannot play a game even if a chess master shows her how (Vygotsky, 1934/1987b, p. 209). In other words, Vygotsky restricts the meaning of imitation to refer to "operations that are more or less directly connected with the mental activity of the child" (Vygotsky, 1930–1931/1998c, p. 202).

The Natural History of the Sign

The primitive mental functions—simple perceptions, natural memory, and involuntary (passive) attention—are linked to concrete experience. These functions are represented by the S–R model. More complex tasks, however, such as the operation of remembering, illustrate the role of auxiliary stimuli in thinking. However, learning to direct one's thinking is a complex, lengthy process that Vygotsky (1931/1997n) referred to as the natural history of the sign.

As indicated in Table 11.1, the first attempts to use signs, such as pictures to remember a set of words, is based on a lack of understanding of their role. That is, the child does not establish a clear semantic link from the pictures to the word. In stage 3, however, the child systematically establishes clear connections between the signs and the stimuli in the experiment. The fourth stage is that of internal sign use, the highest level of development. At this stage, individuals internalize the process of directing memory and attention through the use of self-generated stimuli. In one experiment, for example, one subject remembered the words *beach*, *hail*, and *dress* by creating the sentence, "A lady walked on the beach; it began to hail and ruined her dress" (Leont'ev, 1959, p. 94).

In a series of experiments on word recall, Leont'ev (1959) found qualitative differences among different age groups in the ability to make use of an auxiliary stimulus. A series of 15 words was read to each subject, one at a time, and the subjects were permitted to select a picture from a group for each word to assist them in later recall.

The preschool children either selected pictures randomly and were unable to use them, or they made associations between the pictures and words that did not facilitate word recall. In other words, the mere presence of an association is

TABLE 11.1

Natural History of the Sign

Stage of Sign Use	Characteristics	Arithmetic Example
1. Natural or primitive	Child tries to solve a problem by direct means, such as remembering different selection reactions (striking a particular key) through memorization	Young child can differentiate a group of 3 apples from a group of 7 apples by sight; cannot differentiate between groups of 16 and 19 apples
2. Recognition of the importance of signs	Attempts to use signs without realizing the method of their action; many errors	Beginning of counting on one's fingers, but makes errors and is unaware of the implications
3. External sign use	Systematically matches external signs to stimuli and establishes his/her own connection between them	Counts accurately using fingers, can subtract 2 from 7 in this way
4. Internal sign use	Child relies on internal or self-generated stimuli	The child is able to count in his/her head

Summarized from Vygotsky (1931/1997c, pp. 117–119; 1929, pp. 424–428)

insufficient to guide the child's memory. This level of functioning is analogous to the performance of a man who is able to press on a lever but who is unable to use the skill to move a heavy rock (Leont'ev, 1959, p. 141).

A qualitative change was found in the behavior of the school children. They formed word-picture links that indicated "an adaptation to the future conceived of *as a future*" (Leont'ev, 1959, p. 147). In this action, word and picture are combined into a complex integrated structure. This operation indicates that primitive or natural memory has been converted into an intellectual operation (i.e., a new form of memory).

In contrast, the adults formed complex verbal links between word and picture and often did not use the pictures during recall. Memory had become self-directed in that the created verbal association served as the cue. These phases in the development of mediated memorization indicate that intermediate forms of thinking appear between primitive mental processes and higher mental processes (Kozulin, 1990).

A similar developmental sequence was found in the experiments (described earlier) in which children were given colored cards to help them answer a series of questions. The young children often looked at the cards at inappropriate times or, when setting aside the forbidden colors, named that very color (Vygotsky, 1929/1979b). Older children, however, used the cards successfully to direct their attention and to assist their recall of acceptable colors. Also, the quality of their answers changed. For example, when the forbidden color was "green," grass was described as "In the fall, it is yellow" (Vygotsky, 1929/1979b).

The Development of Speech

In Vygotsky's (1934/1987d) view, the analysis of thinking and speech was a major task for psychology, and the central problem was "*the relationship of thought to word*" (p. 43). He noted that prior efforts to address this issue had oscillated between two extreme poles: the complete fusion of thought and word and the complete separation of thought and word, and neither was correct (p. 44). Instead, speech begins to develop independent of thought, and this stage is referred to as "preintellectual" (Vygotsky, 1934/1987c) (see Table 11.2).

Then, "at a certain point, the two lines cross: thinking becomes verbal and speech becomes intellectual" (Vygotsky, 1934/1987c, p. 112). This process begins when the child discovers the "instructional function" of a word; that is, everything has a name (Vygotsky, 1929, p. 429; Vygotsky, 1934/1987c). However, initially, the child treats the name as simply another characteristic of the object (Vygotsky, 1934/1987c, p. 118). That is, "the child masters the external structure earlier than the internal structure" (p. 118). Therefore, this stage is referred to as "naively psychological."

In the third stage, social speech differentiates into two types: communicative and egocentric (Vygotsky, 1934/1987e, p. 74). Egocentric speech first simply accompanies the child's practical activity. Then it takes on a planning function or the function of resolving problems (Vygotsky 1934/1987c). It is speech for oneself, although it is external physiologically (p. 114). Thus, egocentric speech is a "transitional form in the movement from external to internal speech" (Vygotsky, 1934/1987e, p. 76). When a child, using speech, begins to make a plan, his practical

TABLE 11.2
Stages in the Child's Development of Speech

Stage	Characteristics
1. Preintellectual	A means of social contact in the first year of life; includes laughter, babbling, pointing, and gesture
2. "Naively" psychological	Speech and thinking begin to coincide in second year of life when child discovers things have names; many words are used without grasping the true meaning (e.g., "because, but, when")
3. Dominance of external speech Communicative Egocentric	Speech fulfills a social function Speech first accompanies child's actions in planning and problem-solving, then becomes essential in planning; the "middle link" between external and internal speech
4. Intellectual	External operation moves to the internal plane and undergoes profound change; speech becomes soundless

Summarized from Vygotsky (1934/1987c)

thinking rises to a new level. Behavior is no longer determined by the structure of the visual field, "but by a new form of activity—verbal thinking" (Vygotsky, 1930–1931/1998a, p. 115).

Naturalistic observations of low-income Appalachian children conducted by Berk and Garvin (1984) supported Vygotsky's views. The researchers found that the major function of private speech is self-guidance and that it is greater during cognitively demanding academic tasks. Research also indicated that children who use private speech in conjunction with challenging tasks are more attentive and show greater improvement than their peers (Berk, 2000; Berk & Stuhl, 1995). Also, the rates of private speech are higher over a longer development period for children with learning problems (Berk, 2000).

The final stage of intellectual development is the internalization of egocentric speech. Egocentric speech becomes inner speech as well as the basic structure of the child's thinking. Inner speech, however, is speech carried out almost without words because it is speech for oneself, not for communication (Vygotsky, 1934/1987f, p. 277).

In summary, the child's intellectual growth requires that the child master the social means of thought, which is language. In other words, verbal thought is

not an innate or natural form of behavior. Instead, it is determined by a cultural-historical process with characteristics that differ from natural (primitive) forms of thought.

Both Piaget and Vygotsky considered the acquisition of speech to be a major activity in cognitive development. They differed in their view of the child's egocentric speech. For Piaget, egocentric speech is a characteristic of pre-operational thinking, and this form of speech disappears as the child moves into concrete operations.

In contrast, Vygotsky viewed egocentric speech as an important transitional stage between external and inner speech. It is a significant phase in the child's learning to solve problems and to manage his or her own cognitive activity. Thus, egocentric speech is a transitional stage between social speech and inner speech for thinking.

Of importance is that the development of inner speech is determined by the nature of egocentric speech. Specifically, the structure of speech mastered by the child becomes the basic structure of the child's thinking (Vygotsky, 1934/1987c, p. 120). The implication is that children with impoverished vocabulary and a limited sense of word meaning will have difficulties in planning and problem solving. In other words, developing inner speech is not a guarantee that individuals reach the levels of advanced thinking (the higher psychological functions). For example, in the cross-cultural studies of Vygotsky and Luria (Luria, 1976), illiterate peasants were able to use speech in thinking that simply echoed practical and situational activity. In contrast, people with some education used abstract categories that restructured situational experience (Kozulin, 1984, p. 110).

Development in Children with Disabilities

The basic principles in Vygotsky's cultural-historical theory apply to children with disabilities as well. That is, cognitive development occurs in the context of the social activities of children with adults. The prevailing view at the time Vygotsky was writing was that a sensory defect or a mental weakness was regarded as a biological problem. The then-current belief was that a defect could be compensated for by a heightened sensitivity in another sensory function. Kozulin (1990) noted that examples are the senses of hearing and touch in the blind and vision in the deaf.

In contrast, Vygotsky viewed the problem of the disabling condition as primarily social (Gindis, 1995). That is, society's response to those with disabilities leads to social deprivation that results in defective development (Vygotsky, 1983/1993). The disability, in other words, alters the child's relationship with the world and affects his or her interactions with people. Thus, "the blindness of an American farmer's daughter, of a Ukrainian landowner's son, of a German duchess, of a Russian peasant—are all psychologically different facts" (Vygotsky, 1983, p. 50), in Gindis (1995).

Physical disabilities, such as blindness or deafness, alter the child's relationship with the world and affect his or her interactions with people. Vygotsky noted that self-reports from individuals with these disabilities indicated that the

defects are not perceived as “abnormalities” until they are brought into the social context (Gindis, 1995, p. 78).

The disabilities prevent the children from mastering social skills and acquiring knowledge in the same ways and at the same rate as other children. Also, deafness is a more serious disability than blindness because it prevents the mastery of speech, blocks verbal communication, and limits entry to the world of culture (p. 78).

Vygotsky described disabilities in terms of primary and secondary defects. A primary defect is an impairment of biological origin. Secondary defects are the distortion of higher psychological functions that result from social factors. For example, many symptoms of disabling conditions, such as immature behavior and primitive emotional reactions, are secondary defects that are acquired in the process of social interaction.

Therefore, instead of training other sensory functions, such as acuteness of hearing, Vygotsky maintained that physical or mental defects can be compensated for through alternative, yet equivalent, means of cultural development (Gindis, 1995). Where necessary, symbolic systems should be changed, while preserving the basic meaning of social communication. Examples are the Braille system, sign language, lip-reading, and finger spelling. Further, societies should continue developing special psychological tools that can provide the social and cultural interactions essential for development. Many of today’s computer developments, such as activating a keyboard through a breathing apparatus for paralyzed individuals, are examples.

Summary

Three general principles that are the components of cognitive development may be identified. First, Vygotsky (1931/1966) described two branches of cognitive development. One involves mastering the symbol systems of the culture and the other involves developing the cultural forms of reasoning.

Second, the law of genetic development states that all complex functions begin as social interactions between individuals and gradually acquire meaning and are internalized by the learner. However, also required is practice by the learner of the behaviors that adults used with him or her.

The third principle describes the process whereby speech and other artificial symbols are first mastered as a form of communication and then become instrumental in structuring and managing the child’s thinking. The young child, for example, is unable to use pictures as cues to recall a set of words. However, adults often construct complex verbal relationships as memory aids. The lengthy process of learning to use artificial symbols to structure one’s thinking begins with learning to use auxiliary stimuli to mediate one’s memory. Gradually, over an extended period of time, the individual acquires the capability to construct symbols to aid in thinking. This process is referred to as the natural history (law) of the sign.

The use of speech also changes throughout childhood and follows the same four stages as the use of symbols in thinking. These stages are (1) preintellectual, (2) “naively” psychological, (3) dominance of external sign use, and (4) internalization.

The Nature of Complex Thought

Two conceptualizations developed by Vygotsky reflect his views on the nature of complex thinking. They are the higher mental functions and his concept of development.

The Higher Mental Processes

Like Piaget, Vygotsky (1930–1931/1998a, 1930–1931/1998b) believed that individuals did not attain the higher forms of thinking prior to adolescence. However, Vygotsky described the outcomes of cognitive development as including categorical perception, conceptual thinking (verbal and mathematical), logical memory (memory based on connections and relations among concepts), and voluntary (self-organized) attention. Of importance is that the higher mental functions are not merely a continuation of the elementary functions; instead, they are qualitatively new mental formations.

Table 11.3 illustrates the major differences between the primitive or elementary functions and the higher mental functions. Elementary functions are the natural inborn psychological structures conditioned primarily by biological characteristics (Vygotsky, 1931/1966, p. 31). They are represented by the S–R model and are characterized by immediacy, a reliance on concrete experience, and thought linked to action.

The transformations that lead from elementary to higher mental functions are the result of a lengthy period of development in which the control of one's

TABLE 11.3
A Comparison of Primitive and Higher Mental Functions

	Primitive Functions	Higher Mental Functions
1. Processes	Simple perception, natural memory, involuntary attention	Categorical perception, logical memory, conceptual thinking, self-regulated attention
2. Source of control	Stimulation from the environment	The use of both "object stimuli" and "means stimuli" by the individual to master and control his or her own behavior
3. Dynamics	Co-occurrence of two stimuli	Creation of new links through the individual's artificial combination of stimuli
4. Defining characteristics	Immediacy; bounded by concrete experience	Characterized by conscious awareness (of the processes), abstraction, and control
5. Thinking and reasoning	Determined by natural memory; limited to reproducing established practical situations	Abstract, conceptual; makes use of logical relations and generalizations
6. Origin	Biological factors	Cultural-historical development

mental processes shifts from the environment to the individual. A prerequisite to developing the higher mental functions is awareness of one's thought processes and some control of them. However, the young child is not consciously aware of her thought processes, and even the "school-age child realizes his own thinking operations inadequately still, and for this reason he cannot fully master them" (Vygotsky, 1930–1931/1998b, p. 65). In other words, perceiving one's own thought processes is a prerequisite to mastery and developing logical thinking.

Table 11.4 compares the specific characteristics of each of the elementary and higher cognitive functions. As indicated, the child's memory relies on visual images and concrete experience, whereas the memory of the adolescent (who has mastered the higher functions) relies on concepts with all the connections and relations with other concepts. Similarly, categorical perception is governed by conceptual thinking, and voluntary attention is organized through symbols. In other words, unlike the elementary functions, in which natural memory dominates throughout, the relationship is reversed in the higher mental functions. For the young child, "intellect is a function of memory, then, in the adolescent, memory is a function of intellect" (Vygotsky, 1930–1931/1998a, p. 96).

The Concept of Development

Referring to the work of Ernest Meumann, Vygotsky (1963) described two levels of development. One is actual or completed development. This level is determined by mental tests in which the child attempts to solve problems of increasing difficulty that are standardized for the child's chronological age level (Vygotsky, 1930–1931/1998c, p. 201). The problems that the child solves independently represent the actual level of development.

TABLE 11.4

A Comparison of Elementary and Higher Mental Functions

<i>Simple memory</i>	<i>Logical memory</i>
Relies on visual images and concrete experience	Recall is in the form of concepts "directly connected with comprehension, analysis, and systematization of material" (Vygotsky, 1930–1931/1998a, p. 98)
<i>Simple perceptions</i>	<i>Categorical perception</i>
Based on concrete experience	A synthesis of visual perception and abstract and conceptual thinking
<i>Involuntary attention</i>	<i>Voluntary attention</i>
Controlled from the outside; repelled by or attracted to different objects	Controlled internally; directed through symbols
<i>Syncretic thinking</i>	<i>Conceptual thinking</i>
Pre-conceptual; thinking proceeds from particular to particular	Involves recognizing a thing in all its connections and relations that are synthesized in the concept (Vygotsky, 1930–1931/1998b, p. 53)

Summarized from Vygotsky (1930–1931/1998a, 1930–1931/1998b, 1933/1997d).

However, equally important are the problems that the child can solve with assistance. This level is referred to as the zone of potential or proximal development and it represents the area of “immature, but maturing processes” (Vygotsky, 1930–1931/1998c, p. 202). Vygotsky suggested that the school psychologist should implement any of four strategies to determine this level of development. They are (1) demonstrate solving the problem and observe whether the child can imitate the demonstration, (2) begin solving the problem and ask the child to complete the solution, (3) ask the child to cooperate with another more developed child in solving the problem, or (4) explain the process of solving the problem to the child, ask leading questions, analyze the problem for the child, and so on (p. 202). In other words, these approaches can determine “precisely the mental maturation that must be realized in the proximal and subsequent periods of his stage of development” (p. 203). (Vygotsky [1930–1931/1998c] referred to determining the actual level of development and the zone of proximal development as comprising *normative age-level diagnostics* [p. 204].)

In summary, the higher cognitive functions are the uniquely human capabilities that are the products of cultural-historical development. Unlike the primitive or elementary functions, the higher cognitive functions are characterized by conscious awareness (of one's thinking), abstraction, and control. They also involve the use of logical relations and generalizations. Important for cognitive development is to assess both the child's level of actual development and the level or zone of proximal development. Such an assessment can identify the cognitive functions that are in a stage of maturation, but are not yet fully developed.

PRINCIPLES OF INSTRUCTION

Like Piaget, Vygotsky analyzed particular developmental processes responsible for complex cognitive functioning. Piaget emphasized the growth of logical thinking as the goal of cognitive development. Vygotsky, in contrast, described the transformation of simple perception, involuntary attention, and simple memory into categorical perception, conceptual thinking, logical memory, and self-organized attention.

Neither Piaget nor Vygotsky developed explicit principles of instruction. Although both theorists commented on certain aspects of the teaching process, instructional principles may be inferred only indirectly from their writings.

Basic Assumptions

The role of the culture in learning and the relationship between instruction and development provide the foundation for inferring basic assumptions about instruction.

Role of the Culture

According to Vygotsky, the culture does more than provide the setting in which learning occurs. Instead, the very structure of social functioning determines the

structure of individual psychological functioning. That is, major concepts and ideas as well as the means of communication and ways of viewing the world are created by the culture. Thus, the child learns to think in ways that are directly fostered and developed by his or her particular culture.

Therefore, the basic structures of perception, representation, and self-awareness are likely to differ across different historical conditions. Vygotsky and Luria developed a research plan to analyze the cultural-historical shaping of mental processes. The research was conducted in the early 1930s in remote parts of the Soviet Union that had been faced with a radical restructuring of their economic system and culture (Luria, 1976). The research was conducted in the villages and mountain pasture lands of Uzbekistan and Kirghizia. The groups compared on various tasks were (1) Ichkari women in remote villages whose lives were controlled by strict Islamic codes; (2) peasants in remote villages who were not involved in socialized labor; (3) collective farm workers who had experience in planning, distributing labor, and monitoring work output; and (4) women students in a teacher's school.

The tasks, which were accompanied by in-depth interviews, involved perceptual and memory strategies, classification, and problem solving. In one task, the subjects were shown 27 different hues of skeins of wool. When asked to name the colors, the collective farm workers and women students used categorical names (red, blue, yellow) with occasional designations (light yellow, dark blue) (Luria, 1976). In contrast, the Ichkari women used graphic names, such as fruit-drop iris and spoiled cotton (p. 26).

When asked to group the different skeins, the collective farm workers and students usually arranged all the colors in seven or eight groups. In contrast, some of the Ichkari women maintained that the task could not be done while others arranged the skeins of yarn into series of colors according to increasing brightness. One series, for example, included pale pink, pale yellow, and pale blue. In other words, attempts by the experimenter to obtain a color grouping with only one primary color in a group led to failure to perform the task (Luria, 1976, p. 30). The study concluded that comparing objects according to logical attributes and generalizing them to well-known logical categories are not universal operations (Luria, 1971, p. 269).

Relationship Between Instruction and Development

According to Vygotsky (1934/1962; 1934/1987b), instruction influences development in two ways. One is that good learning precedes and leads development. That is, the tasks that the child can accomplish in collaboration with the teacher today, she can accomplish alone tomorrow (Vygotsky, 1934/1962, p. 104). Thus, both instruction and imitation play a major role in the child's development. "They bring out the specifically human qualities of the mind and lead the child to new developmental levels" (Vygotsky, 1934/1962, p. 104).

Planning instruction, therefore, includes determining the lowest threshold at which instruction may begin, since only a certain minimal development of cognitive functioning is required (Vygotsky, 1934/1962, p. 104). Like Montessori, Vygotsky believed that each subject of instruction is most influential at a certain

period because the child is most receptive at that time. Therefore, important qualities for teachers include a sensitivity to the actions and words of the child and the ability to structure tasks so that the child may exercise his or her emerging capabilities.

The second way that instruction influences development is in the learning of school subjects, such as reading and mathematics. These subjects include operations that require awareness and deliberate control. Learning to master and consciously control operations (such as addition and multiplication) and to think in subject matter concepts furthers the development of complex mental functions (Vygotsky, 1934/1987b).

In summary, two basic assumptions related to instruction may be inferred from Vygotsky's theory. The first is that the structure of social relations in the cultural setting determines the individual's psychological structure. The second is that instruction should precede and thereby maximally influence development.

Components of Instruction

Important components of instruction are (1) determining the appropriate level of instruction, (2) implementing the genetic law of cognitive development, and (3) developing students' verbal thinking.

Determining the Appropriate Level of Instruction

Vygotsky (1934/1987b) maintained that school instruction plays an essential role in the child's cognitive development. To be useful, instruction must move ahead of development and lead it. Specifically, "*instruction impells (sic) or wakens a whole series of functions that are in a stage of maturation lying in the zone of proximal development*" (p. 212). To succeed in this role, instruction should focus on problems that the student can solve "in collaboration with or under the guidance of a teacher" (p. 211).

That is, instruction should occur between the lower threshold of development (the problems the child can complete independently, such as the problems on an I.Q. test) and an upper threshold represented by the problems the child can complete with assistance (Vygotsky, 1934/1987b, p. 211). The implication is that, if psychological testing does not include an assessment of the upper threshold of the child's cognitive functioning, then the teacher should schedule time to determine informally the level of the child's joint problem solving. This exercise can provide information to the teacher as to the appropriate level of instruction for the child.

Vygotsky (1934/1987b) cautioned that a particular lesson in a subject such as arithmetic will not correspond to a particular stage of development (p. 207). However, for example, arithmetic instruction can have an important influence on moving attention from the domain of lower mental functions to that of the higher mental functions (p. 207). Voluntary attention, a higher mental function, begins when "one controls one's own behavior with the help of symbolic stimuli" (Vygotsky, 1930/1999b, p. 36). Also "the first, second, third, and fourth components of arithmetic instruction may be inconsequential for the development

of arithmetic thinking, but some fifth component may be decisive" (Vygotsky, 1934/1987b, p. 207). That is, the child, at that point, has learned a general principle.

An additional point is that the zone of proximal development is not always manifested in social interaction. For example, the school-age child operates in the zone of proximal development as he or she solves problems at home "on the basis of a model he has been shown in class," i.e., imitates the teacher through a process of re-creating previous classroom collaboration with the teacher. The "help," Vygotsky (1934/1987b) noted, is "invisibly present" (p. 216). Another example is a six-year-old who, growing up in a home with many books, newspapers, and magazines where the parents are avid readers, imitates them and learns to read without explicit instruction (Valsiner, 1988, p. 148).

Implementing the Law of Genetic Development

According to Vygotsky, internal psychological functions begin as interactions between the child and a knowledgeable member of the culture. However, the assumption should not be made that a sudden clean shift occurs from social to individual functioning. That is, a child does not simply work with someone on a task and then begin to carry it out independently (Wertsch, 1985b, p. 158). Instead, contemporary research indicates that several changes take place on the interpersonal level, and each is accompanied by a change on the intrapersonal level. Wertsch (1985b) identified five important factors in the transition from inter- to intrapsychological functioning. They are (1) the cognitive readiness of the child, (2) a willingness by the adult to transfer responsibility to the child, (3) the adult's use of "reflective assessments" as feedback to the child on the significance of particular behaviors, (4) the explicitness of the adult's directives, and (5) the construction of a joint definition of the task that gradually moves toward a culturally appropriate definition (Wertsch, 1985b, p. 166).

Establishing a joint definition of the task initially is particularly important because the adult and the child likely bring different concepts to a task setting. Therefore, the challenge to the adult is to find a way to communicate with the child so that he or she can participate in the task with the adult. This communication is the foundation for the transition to interpsychological functioning (Wertsch, 1985b, p. 161).

Vygotsky (1983/1997b) noted that in implementing lessons, it would be foolish not to consider the concrete and graphic nature of pupils' memory (p. 224). However, he also cautioned that "it would also be folly to cultivate this type of memory. This would be to keep the child at a lower step of development and to fail to see that the concrete type of memory is only a transitional step to a higher type, that concrete memory must be overcome in the process of teaching" (p. 224).

Also important is that social interaction is only the first step. The learner's subsequent activities are also essential. The student must imitate, invent, and practice with respect to himself the same forms of behavior that others formerly practiced with respect to him (Vygotsky, 1931/1966, p. 157).

An example is the teaching of composition to older Brazilian women in the College of the Bahamas (Fiore & Elsasser, 1982). Teaching began with the use of "generative themes," which are themes drawn from the students' daily lives. These themes were important because they allowed the students to explore the larger cultural and historical implications of personal experience. One generative theme, for example, was marriage. The students gradually moved from personal anecdotes to more sophisticated forms of expression, such as cause and effect, definition, and comparison and contrast. The increasing sophistication of the women's writing was accompanied by a more analytical approach to the issues.

Developing Students' Verbal Thinking

A major premise to Vygotsky's theory is that the signs and symbols used for communication in a culture are also the mechanisms for cognitive development. When the child enters school, word meaning and speech are two mechanisms that can facilitate the development of verbal thinking. First, the inner aspect of the word (word meaning) is key to freeing the child from perception and sensation (Vygotsky, 1934/1987d, p. 47). The reason is that "the word does not relate to a single object, but to an *entire group or class of objects*" (p. 47). In other words, from a psychological perspective, word meaning is primarily a generalization and is, therefore, a *verbal act of thought* (p. 47).

Therefore, following Vygotsky, a goal of school instruction should be developing word meanings. However, if the expectation is that the student is to internalize existing knowledge, thought processes are not required to grow, change, and develop. That is, teaching subjects that involve symbol systems, such as writing and mathematics, will not bring about the development of complex mental functions if the goal is the transmission of knowledge (Elsasser & John-Steiner, 1977, p. 363).

Second, "thinking depends on speech, on the means of thinking, and on the child's socio-cultural experience" (Vygotsky, 1934/1987c, p. 120). In other words, the structure of speech mastered by the child becomes the basic structure of the child's thinking (p. 120). Thus, the development of inner speech, an important mechanism of thinking, is dependent on the child's basic speech. In the classroom, this relationship has implications for children with poor vocabularies and those whose primary language is a dialect of English (non-standard English) or a language other than English.

Also important is that the child's internal speech at school age is a weak, unstable form that is not yet fully functional (Vygotsky, 1930-1931/1998b, p. 70). Therefore, "in order to think, the school child must think aloud" (p. 70). When a child's who has solved a problem on her own obtains an absurd answer, the teacher asks her to solve it aloud. Also important is to teach her to be conscious of her own operations, following each step, and to control the course of her thinking (p. 71).

The research conducted by Vygotsky and his colleagues indicated that children gradually move from external sign use to inner speech. School tasks should focus on developing word meanings (generalizations) and assist children to develop their speed as a means of thinking.

In summary, the appropriate level of instruction for a student is the problem that a child can solve with assistance. Such an assessment indicates the cognitive processes that are in the period of maturation, referred to as the zone of proximal development. Also important in the classroom is to implement the law of genetic development in which the teacher or other knowledgeable adult works with the student in school tasks. The student must then imitate, invent, and practice the forms of behavior that were the focus of the interaction with the teacher. Finally, teachers also should work with children to assist them in learning word meanings and in learning to use speech as a tool of thinking.

Designing Instruction to Develop Complex Cognitive Functions

Important issues in developing complex cognitive functions are (1) the “foundational” psychological functions, (2) teaching writing, (3) the role of scientific (subject-matter) concepts, and (4) the role of peers, the teacher, and the learner.

The Foundational Psychological Functions. Vygotsky (1934/1987b) identified two broad psychological functions that form the foundation of the higher cognitive functions. These two functions are conscious awareness of and mastery (volitional control) of one’s mental activities (p. 208).

The importance of the foundational functions is that they begin to emerge at school age and school instruction is essential in their development. That is, consciousness of and self-regulatory control of one’s thinking are in the child’s zone of proximal development. For example, the preschool child can use the correct case and verb form in oral speech but is unaware that such forms exist, and he or she cannot conjugate a verb fully (p. 206). An important effect of school learning is developing conscious awareness and control of such activities. For example, the child becomes aware of different verb forms and tenses and can choose the correct form when writing.

Teaching Writing. Vygotsky (1934/1987b) identified reasons for the child’s difficulty in learning writing that also explain its contribution to developing thinking. First, it does not reproduce oral speech but is a unique speech function (p. 202). It requires a high degree of abstraction that “uses representations of words rather than the words themselves” (p. 202). In other words, “written speech is the algebra of speech” (p. 203).

Second, it is a conversation with a sheet of paper rather than another individual. Therefore, the child must conceptualize the receiver of the message. Third, the motivations for oral speech are present prior to conversing with another, for example. However, the motivations for writing are less accessible to the child when he begins to learn to write (p. 203). In written speech, the writer must create the situation (p. 203). Finally, in choosing words and phrases, unlike

most oral speech, the process is intentional and must reflect expected syntactic sequence.

Therefore, instruction in writing is one of the most important subjects in the child's early school years because it requires deliberateness and analysis. Learning to write assists the child to develop the foundational cognitive functions of conscious awareness and control of one's thinking processes (p. 211).

Some writing curricula in the early grades address the motivational and deliberateness of the process. Provided are uninterrupted reading and writing time; access to books, picture books, and magazines; opportunities for other students to serve as an audience of early drafts; and publication of the children's favorite pieces (see Harste, Short, & Burke, 1988).

The Role of Subject-Matter Concepts. The process of the development of subject-matter concepts (referred to as scientific concepts by Vygotsky) in students "contains the key to the whole history of the child's mental development" (Vygotsky, 1934/1987b, p. 167). One reason is that, even at the simplest level of development, the concept is "an act of generalization" (p. 169). It is "a complex and true act of thinking that cannot be mastered through simple memorization" (p. 169).

Another reason is, at the highest level of development, "thinking in concepts leads to discovery of the deep connections that lie at the base of reality, to recognizing patterns that control reality, to ordering the perceived world with the help of the network of logical relations cast upon it" (Vygotsky, 1930–1931/1998b, p. 48). That is, subject-matter concepts in a domain can be represented in terms of other concepts, and they form an interrelated system. Mastery of subject-matter concepts means that the student can define them easily, implement them in various logical operations, and identify the relationships among them (Vygotsky, 1934/1987b, p. 218).

In contrast, spontaneous or everyday concepts do not have these advantages. They are learned through the child's experience, and their weakness is in the incapacity for abstraction (Vygotsky, 1934/1987b, p. 169). An example is the child's concept of "brother," which is "saturated with the child's own rich personal experience" (p. 178).

Vygotsky (1930–1931/1998b) emphasized that the form of thinking (thinking in concepts that involves the higher cognitive functions) cannot be separated from the content of thinking (pp. 34–39). That is, mastery of a complex system such as algebra does not mean simply filling the forms of thinking present in a three-year-old with new content. New content requires new forms of thinking (p. 35). Particularly important is that "cognition, in the true sense of that word, science, art, various spheres of cultural life may be adequately assimilated only in concepts" (p. 42).

Implications for teaching subjects in middle and high school are (1) to focus on the system of interrelationships among the concepts in the domain, (2) to require students to explain the connections among them, and (3) to implement them logically in different problems and other situations.

The Role of Peers, the Teachers, and the Learner. Many writings on instruction describe the primacy of large- and small-group discussions as an instructional approach, often citing Vygotsky as the source. O'Connor (1996) noted "These beliefs about classroom discussions are generally buttressed by reference to Vygotskian theory, in that collaboration or joint reasoning, the 'intermental' plane of cognition, is viewed as the genesis of a child's individual 'intermental' functioning" (p. 495). However, the term *collaboration*, when used by Vygotsky in reference to the school setting, refers to collaboration between teacher and student (Gredler & Shields, 2004). An example is "the teacher, working with the school child on a given question, explains, informs, inquires, corrects, and forces the child himself to explain; [and] when the child solves a problem, although the teacher is not present, he or she must make independent use of the earlier collaboration" (Vygotsky, 1934/1987b, p. 216). Also, some educators state that, as a part of instruction, the teacher should initially control task elements that are beyond the learner's capability to allow the learner to concentrate on the elements she can complete. This directive reflects Vygotsky's recommendations for *assessment* of the child's cognitive functions that are in the zone of proximal development, not Vygotsky's suggestions for instruction.

Further, on occasion, the general law of genetic development is described in some secondary sources as referring to the relations *among* people instead of the relations *between* people. This subtle change confuses the concept of adult-child collaboration described in the school setting by Vygotsky.

Vygotsky does name one situation in which a particular type of peer interaction can contribute to cognitive development. The situation is that of children contesting the statements of other children, the argumentation described by Piaget (Vygotsky, 1931/1966, p. 40). Specifically, argumentation among children becomes the process of reflection for the individual child. That is, these interactions provide the basis for the child's subsequent development and weighing of alternative perspectives on an issue.

Vygotsky's (1934/1987b) references to learning in the subject areas, in contrast, describe the teacher modeling, explaining, and asking the student for explanations. The importance of the verbalizations by the teacher is that they are the basis for the student's self-questioning and explaining of concepts when studying and reviewing materials.

In summary, designing instruction for complex cognitive functions includes attention to developing the child's conscious awareness and control of his or her own mental activities. These capabilities are the foundation for the higher cognitive functions, and they are beginning to emerge at school age.

Important in the development of the two foundational capabilities is the teaching of writing. The relationship of writing to these capabilities is that it is abstract. That is, sound images must be replaced by symbols, the message often is not addressed to a particular audience, and abbreviated inner speech must be expanded into intelligible form. Of importance is that both reading and writing should be organized for goals important to the child.

Subject-matter ("scientific") concepts also play an important role in the development of higher cognitive functions. Unlike everyday (spontaneous)

concepts, subject-matter concepts are removed from the object or event they represent, and they also form a system. That is, concepts may be expressed in terms of other concepts. Thus, subject-matter concepts foster development of the processes of abstraction and generalization.

Essential in classroom instruction to develop higher cognitive functions is the collaboration between teacher and student. Although some individuals cite Vygotsky as the source for relying on small- and large-group discussions in the classroom, Vygotsky identified the specific activities that teacher-student collaboration should include.

EDUCATIONAL APPLICATIONS

Vygotsky's cultural-historical theory has received considerable attention in the United States in recent years. Two programs to teach reading to poor readers reflect Vygotsky's concepts of teacher-student collaboration, teacher modeling and imitation, and the abstraction of meaning from symbols. One is Reading Recovery designed by Marie Clay (1985) for first-grade children who have been unable to master the reading process in regular classrooms (the lowest 10%). The shared collaboration between teacher and child helps children monitor and integrate information from many sources. That is, they learn to use four types of cues (semantic, syntactic, visual, and phonological [oral language sounds]) and also develop meaning from reading (Clay & Cazden, 1990). The other is reciprocal teaching developed by Palinscar and Brown to teach comprehension strategies to older children with reading problems. Reciprocal teaching in reading helps the children develop the subjective judgment essential in monitoring whether they have understood the text (Brown, 1994, p. 6).

Vygotsky's principles have at least two other important implications. First, the meaning of signs and symbols used in the culture cannot be left to chance. Second, the theory also speaks to society in general as cultures attempt to understand the implications of a media-based society. Historically, thinking and new discoveries produced by civilizations increased as their symbol systems became more advanced. The implications of Vygotsky's theory, however, are profound for a civilization in which the major symbol system is one that makes use of co-occurring stimuli (images) and thus requires of the individual only primitive mental functions. Thinking, in other words, can regress in society as well as show progress from one generation to another.

Classroom Issues

The theory establishes the sociocultural setting as the genesis for cognitive development and learning. Therefore, learner characteristics, cognitive processes, and the context for learning are all viewed from that perspective.

Learner Characteristics

Individual differences and readiness are two issues that are specifically addressed by Vygotsky's theory.

Individual Differences. One of the incomplete concepts in Vygotsky's theory is that of individual differences. However, Vygotsky (1930/1977a) noted that differences in the quality of memory are not the major differences between individuals. Instead, the power of attention and the force of one's drives are the critical differences. In other words, the way that the individual makes use of his or her own capacities, that is, their role in the personality, is the important factor in determining individual differences.

Readiness. The zone of proximal development, in which cognitive functions are beginning to emerge, represents readiness. Because readiness refers to potential development, it cannot be determined by a standardized test.

Motivation. One of Vygotsky's major interests that remained uncompleted at his death was the issue of affect. He believed that primitive emotions developed in the same general cycle and became moral, ethical feelings in the way that primitive mental functions are transformed into complex mental functions (Vygotsky, 1930/1977a). Also, he believed that subjective feelings regulated behavior, but the mechanisms of this regulation remain to be developed.

Cognitive Processes and Instruction

Transfer of learning, developing "how-to-learn" skills, and teaching problem solving are addressed by the theory in terms of the social nature of learning.

Transfer of Learning. All higher mental functions first appear as interactions between a knowledgeable member of society and the child. "Transfer," then, in Vygotsky's view, involves the qualitative shift between interindividual actions and the internalization of these actions as complex intellectual functions. This process, however, is a lengthy one that first involves three major stages. They are (1) the use of the symbol system as communication, (2) the use of the symbol system to guide developing mental abilities, and (3) the development of internal cues and signs to monitor and regulate one's remembering and thinking.

Developing "How-to-Learn" Skills. This issue is not addressed in the terminology familiar to American psychologists. However, Vygotsky does describe the highest level of symbol use—that of creating internal cues to monitor and regulate one's behavior. This activity involves the control of logical memory and thinking through symbol use and is one aspect of learning how to learn.

Teaching Problem Solving. Like the learning of signs and symbols, learning to solve problems occurs in a social context. The teacher models the appropriate behaviors and then provides guidance as the learner works through the task.

The Social Context for Learning

Two aspects of the social setting determine the nature and extent of the child's learning. One is the historical developments inherited by the child as a member of a particular culture. That is, the culture may employ a primitive counting system, as in Papua New Guinea, or it may rely extensively on complex

symbol systems, such as algebra, calculus, and complex probability systems. The nature of the symbol system inherited by the child sets broad parameters on the higher cognitive functions the child can develop.

The second crucial element is the nature of the child's social interaction with knowledgeable members of the society. Only through this interaction does the child acquire both meaning and utilization of important symbols and thereby develop his or her thinking abilities.

The implication in Vygotsky's theory is that the culture that teaches its children symbols as communication only is omitting the most important function of artificial signs, that of mastering and developing one's thought processes.

Relationships to Other Perspectives

Like Piaget, Vygotsky focused on the mechanisms by which individuals develop higher cognitive processes. However, cultural-historical theory defines them as self-regulated attention, categorical perception, logical memory, and conceptual thinking (instead of as logical reasoning processes). Other differences with Piagetian theory are the role of culture in cognitive development, the role of egocentric speech, and the pivotal role of school subjects. Egocentric speech does not disappear, but becomes inner speech. Vygotsky also placed greater emphasis on the role of make-believe play in that it provides opportunities for the child to extend his or her behavior beyond that of his or her average age.

Also of interest is that Vygotsky discussed the importance of developing the cognitive processes of abstraction and generalization through learning concepts some 40 years prior to their discussion in Gagné's conditions of learning and the instructional design literature. Further, particularly relevant, given the current interest in self-organized learning, is Vygotsky's identification of (1) the importance of self-regulated attention, (2) the role of signs and symbols in directing and managing one's learning, and (3) the identification of two key foundational processes in self-regulated learning. They are the learner's conscious awareness of the cognitive process to be developed and voluntary control (mastery) of one's actions. Further, he emphasized the importance of imitation prior to the introduction of modeling in American psychology. Finally, his focus on signification and learner development of meaning identifies Vygotsky (along with Piaget) as an early constructivist.

Developing a Classroom Strategy

Implementing Vygotsky's theory in the classroom changes the roles of both teacher and students. Ideally, one teacher would be working with one or two students; at most, the group should be limited to five or six. The steps for planning instruction inferred from Vygotsky's broad outline are as follows:

Elementary grades:

Step 1: Determine the appropriate instructional level for each child.

1.1 Which tasks/problems reflect important cognitive capabilities?

1.2 Which of the problems can the child solve with teacher assistance?

Step 2: Identify situations that can develop the children's verbal thinking.

- 2.1 What are the key word meanings to be learned?
- 2.2 In what ways can the learner demonstrate that key words are generalizations?

All grades:

Step 3: Structure the learning task as a collaborative teacher-student activity.

- 3.1 What aspects of the task are to be modeled by the teacher?
- 3.2 What self-regulatory skills are to be modeled by the teacher?
- 3.3 In what ways is the student to use signs and symbols to regulate his or her own behavior?
- 3.4 What teacher suggestions and feedback to students are needed to assist learning?

Step 4: Implement instruction and evaluate the results.

- 4.1 Did the teacher gradually add other concepts as the students acquired mastery?
- 4.2 Were the students able to function independently at the conclusion of instruction?
- 4.3 Do the students' skills generalize to other settings and situations?

Classroom Example

The following lessons are taken from day one and day four of a Reciprocal Teaching Lesson (Palinscar & Brown, 1984, p. 138) with a student who met the minimal decoding standards but failed on comprehension. The lessons illustrate the gradual ceding of responsibility to the student.

Day 1: The teacher and student have read one paragraph silently together, and the teacher has modeled the self-review questions one would ask to check comprehension. The second paragraph, also read silently, mentions several poisonous snakes called pit vipers. The paragraph explains the reason for the name and describes some characteristics of one pit viper known as the water moccasin, or "cottonmouth."

Teacher: This paragraph talks about several different kinds of poisonous snakes called pit vipers. What would be a good question to ask about pit vipers that begins with the word *why*?

Student: (no response)

Teacher: How about "Why are the snakes called pit vipers?"

Student: Why do they, uh, put vipers in a pit?

Teacher: Try it again. "Why are the snakes called . . . ?"

Student: Why are the snakes called pit vipers?

Teacher: Good for you. Now what would be a good question to ask about the water moccasin?

Student: The name?

Teacher: What about the name?

Student: Why is it called a moccasin?

Teacher: That's close; try again. What about the name "cottonmouth"?

Student: Why is it called a cottonmouth?

Teacher: Good. But we need to know which snake is called a cottonmouth.

Student: How about "Why is the moccasin called a cottonmouth?"

Teacher: Good. Now let's answer the questions to be sure we understand the paragraph. (Teacher and student review the questions and the answers in the same manner.)

Day 4: The brief paragraph is about a spinner's mate and his characteristics.

Student: (no question)

Teacher: What is this paragraph about?

Student: Spinner's mate. How do spinner's mate . . .

Teacher: Good. Keep going.

Student: How do spinner's mate is smaller than. . . How am I going to say that?

Teacher: Take your time. You want to ask about spinner's mate and what he does, using the word *how*.

Student: How do they spend most of their time sitting?

Teacher: That's almost it. Sitting is the answer to the question. Can you ask the question without using *sitting*?

Student: How do they spend most of their time?

Teacher: Good, but we should name spinner's mate in the question. "How does a spinner's. . ." Now you finish it.

Student: How does a spinner's mate spend most of his time?

Teacher: Good job.

Review of the Theory

Lev Vygotsky, like Jean Piaget, analyzed particular aspects of human cognitive development. Their approach to this task shares four major characteristics. They are (1) the establishment of a theoretical framework for the study of psychological processes, (2) the identification of different psychological structures constructed during development, (3) the analysis of the psychological processes required to attain the highest levels of cognitive development, and (4) an assertion that cognitive development does not proceed through small incremental changes. Instead, it undergoes qualitative transformations.

Vygotsky emphasized the complex mental functions of categorical perception, logical memory, conceptual thinking, and self-regulated attention. The potential for development of these capabilities is determined by the cultural-historical heritage of the child's culture and the child's social experience.

The key to the development of complex mental functions is mastering the signs and symbols of the culture and learning to use them to direct and regulate one's own behavior. The creation and use of arbitrary signs change the psychological nature of processes such as perception, memory, and attention into more complex forms.

Basic principles in cognitive development identified by Vygotsky include the two branches of cultural cognitive development and the general law

of genetic development. Essential in the development of higher cognitive functions are interactions with knowledgeable adults to develop both the meanings of cultural symbols and the ways of thinking of the culture. Also important in this process are the imitation and intervention of the learner in applying actions modeled during adult-teacher interactions. (See Table 11.5.)

The major disadvantage of the theory is that Vygotsky was unable to complete his ideas before his death. Thus, educators are left with a broad outline but with few details on implementation.

Major contributions of the theory include the role of culture in learning and development, recognition of the psychological contributions of signs and symbols in psychological functions, and the importance of social interaction during learning.

TABLE 11.5

Summary of Vygotsky's Cultural-Historical Theory

Basic Elements	Definitions
Assumptions	(1) Human cognition cannot be explained by animal behavior. (2) Humans are rational and gradually gain control of their thinking. (3) Cognitive development can be described by dialectical synthesis. (4) The psychological tools developed by humans change their thinking. (5) Cognitive processes should be studied in ways that reveal their dynamic and changing nature.
Cognitive development	The development of complex mental functions that make use of both given stimuli and created stimuli
Components of development	The internalization of actions that first appear on an interpsychological plane; the mastery of the signs and symbols of the culture and learning to use them to master one's own behavior
Outcomes of cognitive development	Complex mental functions, including self-organized attention, categorical perception, conceptual thinking, and logical memory
Designing instruction for complex skills	Developing conscious awareness of and mastery of one's thinking through teaching concepts, and the use of writing for thinking
ANALYSIS OF THE THEORY	
Disadvantages	The incompleteness of the system and the lack of specific guidelines for implementation
Contributions	Recognition of the psychological contribution of created stimuli in cognitive development; the importance of social interaction and the social nature of learning

CHAPTER QUESTIONS

1. Low SES children typically are viewed as having a disadvantage in school because their homes lack magazines and other reading material and reading is not a regular activity for the parents. How would Vygotsky explain the children's disadvantage?
2. Why would Vygotsky not advocate the use of mechanized devices such as computers to provide remedial instruction?
3. What do you think Vygotsky meant when he said that written language is the algebra of language?
4. Schoenfeld (1985) and others express concern that individuals approach mathematical problems as mechanical exercises and seem to possess little awareness of what they are doing (see discussion in chapter 9). How would Vygotsky explain the problem, and what should instruction include to correct the problem?
5. How might writing be used to develop one's thinking?

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